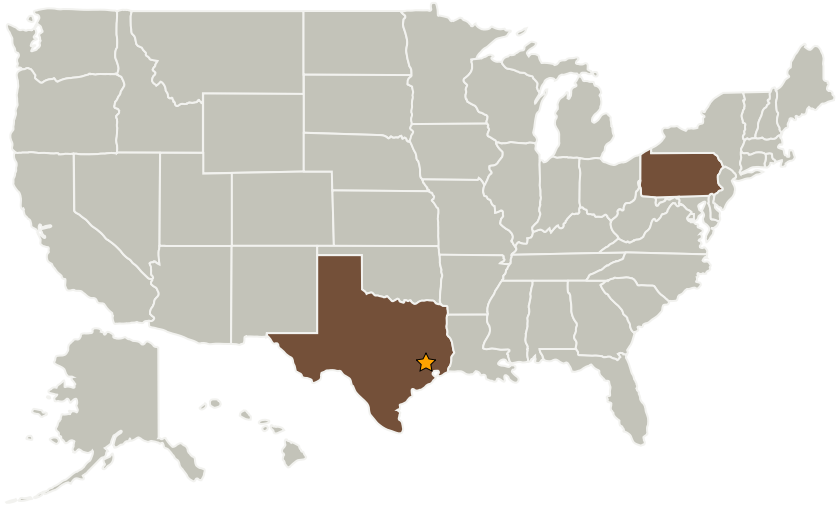
# Heat Pipe Heat Exchangers with Double Isolation Layers for Prevention of Interpath Leakage, Phase I

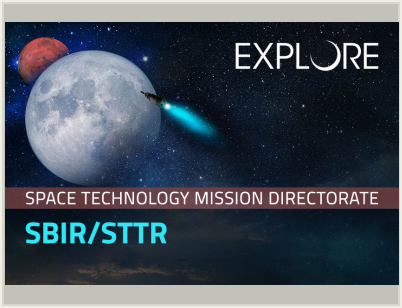
Completed Technology Project (2005 - 2005)

## Project Introduction

Current manned spacecraft heat rejection systems use two heat exchangers and an intermediate fluid loop to provide isolation between the crew compartment air and the exterior fluid loop. Isolation is required because the fluids used are either toxic or can cause suffocation. The extra hardware doubles the mass of the system, consumes more power, and reduces reliability. Advanced Cooling Technologies, Inc., supported by Hamilton Sundstrand, proposes to use a heat pipe heat exchanger to provide two levels of isolation between the two fluid streams. This will allow the safe use of the otherwise toxic or harmful exterior fluids with no danger to the crew and will avoid the mass and power penalty of the existing approach. This approach is also potentially lower mass than an incremental improvement to the existing exchanger. The Phase I work will include conceptual design of a liquid/liquid and liquid/air replacement for the existing exchangers and a liquid/air exchanger that replaces both system exchangers. A system-level trade study will be conducted to assess the impact of the new exchanger designs on power and volume consumption and on thermal performance. Representative exchanger segments will be fabricated and tested to demonstrate readiness of the technology.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Johnson Space Center (JSC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Johnson Space Center(JSC) | Lead Organization | NASA Center | Houston, Texas |
| Advanced Cooling Technologies, Inc. | Supporting Organization | Industry | Lancaster, Pennsylvania |

| Primary U.S. Work Locations | |
|---|---|
| Pennsylvania | Texas |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

David Sarraf

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.1 Heat Acquisition